What is claimed is:

1. A method for determining the fracture toughness of a ball having an indentation defining an equator of the ball, the equator defining north and south poles of the ball, the indentation having precracks and a precrack length, the method comprising the steps of,

applying an applied load in compression through opposing hemispherical surfaces having an arc length angle of less than ninety degrees, the opposing hemispherical surfaces conforming to the surfaces of the ball respectively at the north and south poles so that the ball bulges outwardly at the equator producing tensile stresses,

load determining a critical applied load when the precrack begins to grow under the tensile stresses at the equator, and

toughness determining the fractured toughness of the ball from the precrack length and the critical applied load.

2. The method of claim 1 wherein,

the fracture toughness is less than 15.0 MPa$\sqrt{m}$.

3. The method of claim 1 wherein,

the arc length angle is 75°±10°.

4. The method of claim 1 wherein,

the precrack length is less than 1.33 mm.

5. The method of claim 1 wher in,
the ball is made of silicon nitride.

6. The method of claim 1 wherein,
the ball is a made of a ceramic material.

7. The method of claim 1 wherein,
the ball is made of steel.

8. The method of claim 1 wherein,
the indentation is a pyramidal indent providing a half penny crack defining the precrack.

9. The method of claim 1 wherein,
the indentation is a Vickers indent providing a half penny crack defining the precrack.

10. The method of claim 1 wherein, the toughness determining step comprises the step of computing the toughness from a fracture toughness equation $K=[1.13-0.09(A/C)]\sqrt{[\pi/Q^{\sigma\sqrt{A}}]}$, wherein Q is a geometric factor of the indent such that $Q=1+1.464(A/C)^{1.65}$, σ is an applied stress field created in the ball under the applied load, K is the fracture toughness, C is a half penny crack radius of the precrack on the surface of the ball, and A is a half penny crack radius into the depth of the material, where the ratio A/C is equal to one when the half penny crack is a perfect half circl .

11. The method of claim 10 wherein,

the appli d stress field is a maximum principal stress in MPa and is pr determin d from the size and material of th ball.

12. The method of claim 1 wherein,

the precrack comprises two longitudinal precracks respectively extending from opposing north and south corners of the indent towards the north and south poles of the ball.

13. The method of claim 1 wherein,

the applied load is applied through a load frame applying the applied load to a top platen having a top conforming socket defining a top hemispherical surface of the opposing hemispherical surfaces, and

the ball is disposed in a bottom platen having a bottom conforming socket defining a bottom hemispherical surface of the opposing hemispherical surfaces.

14. The method of claim 1 wherein the load determining step comprising,

imaging the precracks prior to the applying step,

imaging the precracks during the applying step, and

imaging the precracks when the precrack begins to grow when the appli d load is at the critical appli d load.

15. The method of claim 14 wh rein the imaging steps using an imaging microscope focused upon the precrack position at the equator of the ball during the applying step.

16. The method of claim 1 wherein,

the precrack comprises opposing half penny latitudinal precracks and opposing half penny longitudinal precracks.

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